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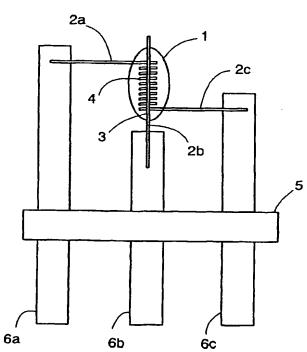
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- (54) Title: SEMICONDUCTOR GAS SENSOR FOR GAS CHROMATOGRAPH
- (54) 発明の名称: ガスクロマトグラフ用半導体ガスセンサ



(57) Abstract: A semiconductor gas sensor for a gas chromatograph for detecting a component in a gas eluted from a separation column after a sample gas mixed with a carrier gas is introduced into the separation column, characterized in that it has a sensing element comprising a metal oxide semiconductor containing indium oxide as a primary component. The semiconductor gas sensor exhibits high sensitivity for a trace amount of a gas and can be suitably used especially for a gas chromatograph for detecting a component in a breath.

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WO 03/019169 A1

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一 国際調査報告書

(57) 要約:

試料ガスがキャリアガスと混合されて分離カラムに導入された後に分離カラムから導出されたガス中成分を検出するガスクロマトグラフ用半導体ガスセンサであって、酸化インジウムを含有する金属酸化物半導体からなる感応素子で構成され、微量のガスを高感度に検出することができ、特に呼気中成分の検出のためのガスクロマトグラフに好適に用いられる。

1

明細書

ガスクロマトグラフ用半導体ガスセンサ

技術分野

本発明は、ガスクロマトグラフに適用される半導体ガスセンサに関するものである。 背景技術

ガスクロマトグラフィーは、ガス中の成分の定性・定量分析に広く用いられており、これは試料ガスをキャリアガスと共に、充填材が充填されている分離カラムに導入し、試料ガス中に含まれる成分が分離カラム中の充填材との相互作用によるリテンションタイム(保持時間)の差により分離され、この分離されたガス中成分を分離カラムから導出し、熱伝導度検出器(TCD)や水素炎イオン化検出器(FID)等の検出器にて検出することにより、クロマトグラムが得られるものである。

近年、ガスクロマトグラフにおける検出器として、上記のようなTCDやFIDに代わり、 更に高感度の半導体ガスセンサを用いることが提案されている(特開平6-213780 号)。

一方、医療分野における呼気中の成分の分析による疾病の発見や治療効果の確認のために、ガスクロマトグラフィーの導入が検討されており、このためガスクロマトグラフ用の検出器として、呼気中の成分を高感度で検出できるものが要望されている。

しかし、従来半導体ガスセンサとして広く用いられている酸化スズガスセンサでは、ガスクロマトグラフの検出器として用いた場合、1ppm以下の低濃度のガス、例えば人間の呼気中に含まれる微量ガスなどを検出するためには感度が不充分であった。

本発明は上記の点に鑑みてなされたものであり、微量のガスを高感度に検出することができ、特に呼気中成分の検出のためのガスクロマトグラフに好適に用いられるガスクロマトグラフ用半導体ガスセンサを提供することを目的とするものである。

発明の開示

本発明に係るガスクロマトグラフ用半導体ガスセンサは、試料ガスがキャリアガスと混合されて分離カラムに導入された後に分離カラムから導出されたガス中成分を検出

するガスクロマトグラフ用半導体ガスセンサにおいて、酸化インジウムを主成分とする 金属酸化物半導体からなる感応素子を備えたものであり、これによって、分離カラムを 通過することにより分離された試料ガス中の成分を高感度で検出することができる。

上記感応素子中には金を添加することが望ましく、この場合は、試料ガス中の成分を更に高感度かつ良好な応答性で検出することができる。

図面の簡単な説明

図1は本発明の実施の形態の一例を示す、ガスセンサの要部概略構成図である。

図2は同上のガスセンサの一部破断した正面図である。

図3は同上のガスセンサを使用するガスクロマトグラフの外観を示す斜視図である。

図4は同上のガスクロマトグラフの構成を示す概略図である。

図6は同上に使用する分離カラムを示す斜視図である。

図5は同上のガスクロマトグラフの他の構成例を示す概略図である。

図7は本発明における実施例1及び比較例1~3における、試料ガスの検出結果を示すクロマトグラムである。

図8は図7に示すクロマトグラムに基づく、実施例1及び比較例1~3における、硫化水素及びメチルメルカプタンの検出時の検出ピークのピーク面積を示すグラフである。

図9は実施例1~3における、試料ガスの検出結果を示すクロマトグラムである。

図10は図9に示すクロマトグラムに基づく、実施例1~3における、硫化水素及びメチ (ルメルカプタンの検出時の検出ピークのピーク面積を示すグラフである。

図11は実施例3において、硫化ジメチルを含有する試料ガスの検出結果を示すクロマトグラムである。

図12Aは実施例3における、試料ガス中の硫化水素、メチルメルカプタン及び硫化ジメチルの含有量を変動させた場合の、検出ピークのピーク面積の変動を示すグラフである。

図12Bは実施例1における、試料ガス中の硫化水素及びメチルメルカプタンの含有量を変動させた場合の、検出ピークのピーク面積の変動を示すグラフである。

図13は実施例3における、種々のガス成分を単独で含む試料ガスの検出結果を示す

クロマトグラムである。

発明を実施するための最良の形態

以下、本発明の実施の形態を説明する。

半導体ガスセンサを構成する感応素子1は酸化インジウムを主成分とする金属酸化物半導体から構成されるものであり、これにより、ガス中の硫化水素やメチルメルカプタン等の成分を高感度で検出できる。感応素子1全量に対する酸化インジウムの含有量は、好ましくは50~100重量%の範囲とする。

また感応素子1中には更に金を含有させることにより、更に高感度かつ応答性が良好な感応素子1が得られる。金の添加量は特に制限されないが、感度と応答性とを十分に向上させるには、酸化インジウム100重量部に対してO. 1~10重量部の範囲とすることが好ましい。

また、この感応素子1には、バインダーとして、有機シリカやコロイダルシリカ等のシリカ系バインダーや、アルミナゾル等のアルミナバインダーを添加すると、素子強度を向上することができる。バインダーの添加量は特に限定されるものではなく、感応素子1に充分な強度を付与するために必要とされる適宜の量が用いられる。

この感応素子1の製造方法を例示する。先ず、塩化インジウム水溶液にアンモニアを添加して得られる酸化インジウムを例えば500℃で1時間焼成した後に粉砕して、粉体状の酸化インジウムを得る。

次いで、金を添加する場合には、例えば粉体状の酸化インジウムに塩化金酸水溶液を、この酸化インジウムに対する金の含有量が所望の値(例えば0.3%)となるように添加する。そしてこれを例えば700℃で1時間焼成することにより、金が添加された酸化インジウムを得る。

この粉体状の酸化インジウム又は金が添加された酸化インジウムに、水を加えてペースト状として、センサ基体に塗布又は印刷した後、例えば空気中で700℃で10分間焼成して、感応素子1が得られる。

また感応素子1中に金を含有させる場合には、まず金が添加されていない酸化インジウム粉体に、水を加えてペースト状として、センサ基体に塗布又は印刷した後、例えば

空気中で700℃で10分間焼成した後に、例えば0.003gの焼結体に対して塩化金酸水溶液(金含有量3mg/cm³)を0.05μl塗布し、更に700℃で10分間焼成することにより、酸化インジウムに対する金含有量が0.5重量%の感応素子1を形成することもできる。

このようにして得られる感応素子1を用い、この感応素子1に電気抵抗測定用の一対の電極を設けることにより、半導体ガスセンサを構成することができる。

図1、2に示す半導体ガスセンサでは、ヒータ4及び芯線3をセンサ基体として、このヒータ4及び芯線3を覆うように楕円球体状に感応素子1が形成されている。この半導体ガスセンサは、支持蓋5に支持された状態で有底筒状のセンサ筐体8内外に突出する3本の端子6a,6b,6cと、端子6a,6b,6cにリード線2a,2b,2cを接続固定し、またセンサ筐体8の天上面にはガス導入用のステンレス製の金網9が設けられている。ここに、ヒータ4は上述のリード線2a,2c間にコイル状に設けられ、芯線3は上述のリード線2bにてコイル状のヒータを貫通するようにして形成されている。また、リード線2bとリード線2a,2cのいずれか一方とで電気抵抗測定用の電極を構成し、リード線2aとリード線2cとがヒータ加熱用の電極を構成している。

この半導体ガスセンサは、ガスクロマトグラフの検出器14を構成するものであり、このとき検出器には必要に応じて、半導体ガスセンサの検知出力を増幅するアンプが設けられる。

図4、6はガスクロマトグラフの装置構成の概略を示すものであり、図3はガスクロマト グラフの外観を示す。

図4に示すガスクロマトグラフは装置本体10に、測定対象である試料ガスや検出器90の構成等に応じた水素ガス、ヘリウムガス等の適宜のキャリアガスが充填されたガスボンベ18が装置本体10に接続されている。装置本体10内にはガスボンベ18から供給されたキャリアガスが流通するガス流路21の上流側から下流側に沿って、流量調整器30、流量計150、試料ガス取込口60、分離カラム70、検出器90が順に設けられている。また装置本体10には、装置本体10の動作設定や装置本体10における検出結果の解析等を行う制御部101と、制御部101における動作設定や検出結果、その解析結果等を表示する表示部102とが接続されている。制御部101及び表示部102

は図3に示すようにパーソナルコンピュータ100にて構成することができ、装置本体10 とパーソナルコンピュータ100とはケーブル103にて接続されている。

また図3に示すように、装置本体10のハウジング11には、電源スイッチ12、分離カラム70の加熱保持温度を設定するカラム加熱温度調整盤13、流量調整器30におけるキャリアガスの流量を設定するキャリアガス流量切替スイッチ14、測定動作の開始を設定する動作開始スイッチ15が設けられており、また試料ガス取込口60がハウジング11の外面に開口して設けられている。

上記の分離カラム70には、図5に示すように、その外面にラバーヒータ80を密接して配設している。分離カラム70はステンレス、銅等の金属や、ポリフッ化エチレン樹脂(テフロン(R)等)等の樹脂成形体等にて中空筒状に形成されており、内部には固定相となる充填材が充填される。分離カラム70を樹脂成形体にて形成する場合にはその外面に金属箔等で金属被覆を施して熱伝導性を向上することが好ましい。充填材は検出対象の試料ガスやキャリアガスの種類に応じた適宜のものが用いられ、例えばジーエルサイエンス株式会社製の「β,β'-ODPN 25%Uniport HP」が充填されているものを用いることができる。ラバーヒータ80はシリコーンラバーシート等の絶縁性ラバー81にて抵抗体822を絶縁したフレキシブルなヒータであり、抵抗体32が分離カラム70の外間面に一端側から他端側に亘って螺旋状に周回するようにして、分離カラム70の外面に密着して配設される。また、この分離カラム70には熱電対からなる温度センサ72が設けられており、この熱電対はポリフッ化エチレン樹脂(テフロン(R)等)やガラスウール等の絶縁材にて絶縁被覆された状態で分離カラム70の外面に配設され、この温度センサ72にて分離カラム70の温度を検知するようにしている。

このような分離カラム70の近傍には冷却用のファン75が配設される。このファン75 は分離カラム70に向けて送風を行うように配設されている。

また装置本体10内にはカラム加熱温度調整盤13における設定動作に従って動作する温度制御器76が設けられており、上記の温度センサ72による検知結果は温度制御器76に入力され、またラバーヒータ80における通電量や、冷却用ファン75の駆動は、温度センサ72による検知結果に基づいて温度制御器76にて制御される。

この図4に示されるガスクロマトグラフを用い、電源スイッチ12を操作してガスクロマト

グラフを起動し、動作開始スイッチ15を操作して測定動作の開始を設定し、ガスボンベ18からガス流路21内にキャリアガスを供給すると共に試料ガス取込口60から試料ガスを導入すると、ガス流路21に供給されたキャリアガスの流量が流量調整器30にて調整され、流量計50による検知によりキャリアガスの流通とその流量が確認された後に、試料ガス取込口60から供給された試料ガスがキャリアガスと混合される。この混合ガスは分離カラム70に導入されて、分離カラム70内部の固定相を通過することにより固定相との相互作用によってガス中成分が分離されて、分離カラム70から導出される。次いで、分離カラム70から導出されたガス中成分が検出器90にて検出され、この検出情報が制御部101に入力されて解析され、クロマトグラムが得られるものであり、またこの検出結果が表示部102にて表示されるものである。

この測定動作中においては、分離カラム70は温度制御器76による制御により、カラム加熱温度調整盤13にて設定された所定の温度となるようにラバーヒータ80への通電がなされて、加熱される。このとき温度制御器76は温度センサ72による検知結果を基にして、ラバーヒータ80への通電量を制御し、また必要に応じてファン75を駆動することにより、分離カラム70を所定の温度に加熱保持する。このため、分離カラム70におけるガス中成分のリテンションタイムを一定に保って、正確な測定が行われる。

また、図6には、キャリアガスとして空気を用いるようにしたガスクロマトグラフの装置構成の一例を示す。このガスクロマトグラフの装置本体10A内にはキャリアガスが流通するガス流路21Aの上流側から下流側に沿ってエアーポンプ20、リーク流路26、流量調整器30A、浄化フィルタ40、流量計50A、試料ガス取込口60A、分離カラム70A、検出器90Aが順に設けられている。

エアーポンプ20は外気をガスクロマトグラフ内のガス流路21Aに送出するものである。またリーク流路26はガス流路21Aから外気に向けて分岐されると共にリーク弁27が設けられ、ガス流路21Aに流入した過剰な空気をリーク流路26から外気に放出することによりガス流路21Aの内圧が過度に大きくなることを抑制し、エアーポンプ20にかかる負荷を調節するようにしている。また浄化フィルタ40は内部に活性炭及びシリカゲルを充填するなどして構成され、ガス流路21Aを流通するキャリアガス(空気)を清浄化するものである。また流量調整器30A、流量計50A、試料ガス取込口60A、分離カラム7

OAの構成は、図4に示されるものと同様である。

この図6に示されるガスクロマトグラフでは、エアーポンプ20によってガス流路21Aに供給される空気の流量が流量調整器30Aにて調整された後、この空気が浄化フィルタ40を通過することにより清浄化され、更に流量計50Aによる検知により空気の流通とその流量が確認された後に、試料ガス取込口60Aから試料ガスが供給されて空気と混合される。この混合ガスは分離カラム70Aに導入されて、分離カラム70A内部の固定相を通過することにより固定相との相互作用によってガス中成分が分離されて、分離カラム70Aから導出される。次いで、分離カラム70Aから導出されたガス中成分が検出器90Aにて検出され、この検出情報が制御部101Aに入力されて処理され、クロマトグラムが得られるものであり、またこの検出結果が表示部102Aにて表示されるものである。

このようなガスクロマトグラフでは、キャリアガスを供給するためにガスボンベを接続する必要がなくなり、更に装置の小型化が可能となる。

以上のようにして構成されるガスクロマトグラフにおいて、検出器として上記のような 半導体ガスセンサを適用すると、分離カラム70を通過したガスを検知することにより、 感応素子1が感応する試料中のガス中成分が分離され、この分離された各ガス中成分 が半導体ガスセンサにて高感度で検知される。ここで、本発明では上記のような感応 素子1を用いているために、硫化水素、メチルメルカプタン、硫化ジメチル、アセトン、イ ソプレン、エタノール、アセトアルデヒド等を分離してそれぞれの検出を行うことができる ものであり、またその他にも、後述する実施例に示すような種々のガスを検出すること ができるものである。またカラム条件を変更することにより、更に他のガス成分を検出し たり、特定のガスを高感度で検出したりすることができるものであり、例えば分離カラム 70中の充填材としてジーエルサイエンス株式会社製の「PorapaqQ」を用い、カラム温 度を170℃として測定を行うと、アセトンを更に高感度で測定することができて、50pp b程度の低濃度のアセトンの検出も可能となる。

このように上記の半導体ガスセンサにてガスクロマトグラフにおける検出器14を構成すると、ガスクロマトグラフを医療分野等における呼気中の成分検出用として構成することができる。例えば歯科医療における呼気中のメチルメルカプタン、硫化水素、硫化

ジメチル等の分析による口臭の有無の判定に利用することができるものである。 以下、本発明を実施例によって詳述する。

<u>実施例1</u>

半導体ガスセンサとしては、図1、2に示すものを作製した。ここで感応素子1としては、次に示すようにして形成されたものを用いた。

まず塩化インジウム水溶液にアンモニアを添加して得られる酸化インジウムを500℃で1時間焼成した後に粉砕して、粉体状の酸化インジウムを得た。次に、この粉体状の酸化インジウムに、水を加えてペースト状として、センサ基体に塗布した後、空気中において700℃で10分間焼成して、感応素子1を形成した。

実施例2

塩化インジウム水溶液にアンモニアを添加して得られる酸化インジウムを500℃で1時間焼成した後に粉砕して、粉体状の酸化インジウムを得た。次いで、この粉体状の酸化インジウムに塩化白金酸水溶液を、酸化インジウムに対する金の含有量が0.3重量%となるように添加した後、700℃で10分間焼成した。この金が添加された酸化インジウムに、水を加えてペースト状として、センサ基体に塗布した後、空気中で700℃で10分間焼成して、感応素子1を形成した。

それ以外は実施例1と同様にして半導体ガスセンサを形成した。

<u>実施例3</u>

塩化インジウム水溶液にアンモニアを添加して得られる酸化インジウムを500℃で1 時間焼成した後に粉砕して、粉体状の酸化インジウムを得た。次いで、この酸化インジウム粉体に、水を加えてペースト状として、センサ基体に塗布した後、空気中において700℃で10分間焼成して0.003gの焼結体を形成し、これに対して塩化金酸水溶液(金含有量3mg/cm³)を0.05μℓ 塗布し、更に700℃で10分間焼成することにより、酸化インジウムに対する金含有量が0.5重量%の感応素子1を形成した。

それ以外は実施例1と同様にして半導体ガスセンサを形成した。

比較例1

無水タングステン酸を500℃で1時間焼成して得られる三酸化タングステンを粉砕して粉体状の三酸化タングステンを得た。この粉体状の三酸化タングステンに水を加え

てペースト状とし、センサ基体に塗布した後、空気中で700℃で10分間焼成して、感応素子1を形成した。

それ以外は実施例1と同様にして、半導体ガスセンサを形成した。

比較例2

四塩化スズ水溶液にアンモニアを添加して得られる水酸化スズを500℃で1時間焼成した後に粉砕して粉体状の酸化スズを得た。この粉体状の酸化スズに水を加えてペースト状とし、センサ基体に塗布した後、空気中で700℃で10分間焼成して、感応素子1を形成した。

それ以外は実施例1と同様にして半導体ガスセンサを形成した。

比較例3

塩化亜鉛水溶液にアンモニアを添加して得られる水酸化亜鉛を500℃で1時間焼成した後、粉砕して、粉体状の酸化亜鉛を得た。この粉体状の酸化亜鉛に水を加えてペースト状とし、センサ基体に塗布した後、空気中で700℃で10分間焼成して、感応素子1を形成した。

それ以外は実施例1と同様にして、半導体ガスセンサを形成した。

<u>評価試験</u>

実施例1~3及び比較例1~3の半導体ガスセンサを、図6に示すようなキャリアガスとして空気を用いるガスクロマトグラフの検出器14に適用して、試料ガスの測定を行った。

ここで、分離カラム30としては、内径5mm、長さ25cmのテフロン(R)製チューブ中に充填材としてジーエルサイエンス株式会社製の「β,β'-ODPN 25%Uniport HP」を充填し、その外面にラバーヒータ31を密接して配設したものを用い、カラム温度を40°Cに保持した。

また試料ガスとしては硫化水素を0.05ppm、メチルメルカプタンを1ppm含有するものを試料ガス供給口11からシリンジを用いて0.5cm³注入することにより供給するものとし、またキャリアガス(清浄空気)の流量は、20cm³/minとした。

実施例1及び比較例1~3にて得られたクロマトグラムを図7に、このクロマトグラムにおける硫化水素及びメチルメルカプタンの検出ピークのピーク面積を図8にそれぞれ示

す。尚、図7における縦軸の出力値は絶対値ではなく、適当な値をOとした場合の相対 値を示している。

これらの結果から明らかなように、実施例1では比較例1~3よりも高感度で硫化水素及びメチルメルカプタンが検出され、1ppm未満の領域においてこれらのガスが検出可能であることが判明した。

また実施例1~3にて得られたクロマトグラムを図9に、このクロマトグラムにおける硫化水素及びメチルメルカプタンの検出ピークのピーク面積を図10にそれぞれ示す。

これらの結果から明らかなように、金を添加した実施例3では実施例1,2よりも高感度で硫化水素及びメチルメルカプタンが検出され、またガス検出後の検出出力の戻りが速くテーリングが小さいものであり、応答性が非常に良好なものであった。

また、実施例3において、硫化ジメチルを含有する試料ガスについての測定を行った結果、得られたクロマトグラムを図11に示す。ここで、試料ガスとしては、硫化ジメチル 濃度が1. Oppmのものと、0. 3ppmのものについて、それぞれ測定を行い、その他の測定条件は上記のものと同様とした。

この結果から明らかなように、本発明の半導体ガスセンサでは、硫化ジメチルについても高感度に測定できるものである。

また、実施例1,3において、試料ガス中の硫化水素及びメチルメルカプタンの含有量を変動させた場合の、検出ピークのピーク面積の変動を調査した結果を図12に示す。図12Aは実施例3における結果を示し、図12Bは実施例1における結果を示すもので(ある。また実施例3においては、硫化ジメチルについても同様の調査を行い、その結果を図12A)に併せて示している。

この結果から明らかなように、実施例1、3での検出ピークのピーク面積は検知対象のガス濃度の増減に応じて増減し、これにより検出ピークのピーク面積から検出対象のガスを精度良く定量することができることが確認される。

また、メチルメルカプタン、硫化水素及び硫化ジメチルの濃度が30ppb程度の濃度においても検出可能であることが確認された。

ここで、呼気中のメチルメルカプタン、硫化水素、硫化ジメチル等の揮発性硫黄化合物の濃度について、口臭を感じるか感じないかの境界は100~300ppb程度であると

いわれており、これに対して実施例1、3ではこれらのガスを30ppb程度の濃度まで定量的に検出することができるため、これまで官能的な判定に頼ることの多かった口臭の有無を、正確な数値で判定することが可能なものである。

また、実施例3において、種々のガス成分についてそれぞれ単独でガス成分の検出を行った。このとき得られた各ガス成分ごとのクロマトグラムを図13に示す。尚、このときキャリアガスの流量は10cm³/minとして測定を行っている。また硫化ジメチル、メチルメルカプタン、硫化水素については、それぞれ濃度1ppmの試料ガスに対して測定を行い、それ以外のガスについては、濃度10ppmの試料ガスについて測定を行っている。その他の条件は上記のものと同様である。

この結果から明らかなように、本発明のガスクロマトグラフ用半導体ガスセンサでは、硫化ジメチル、メチルメルカプタン、硫化水素以外に、一酸化炭素、水素、メタン、アンモニア、イソプレン、アセトアルデヒド、アセトン、エタノール等の種々の成分の測定をも行うことができるものである。

請求の範囲

- 1. 試料ガスがキャリアガスと混合されて分離カラムに導入された後に分離カラムから 導出されたガス中成分を検出するガスクロマトグラフ用半導体ガスセンサにおいて、酸 化インジウムを主成分とする金属酸化物半導体からなる感応素子を具備して成ること を特徴とするガスクロマトグラフ用半導体ガスセンサ。
- 2. 上記感応素子中に金を添加して成ることを特徴とする請求項1に記載のガスクロマトグラフ用半導体ガスセンサ。

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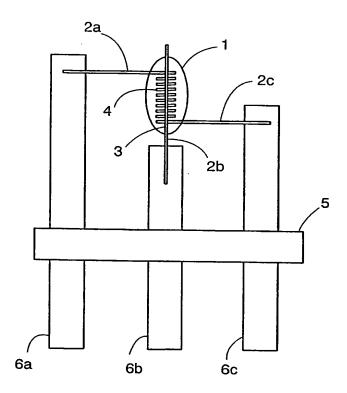
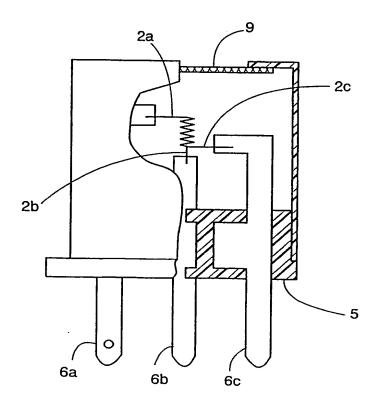
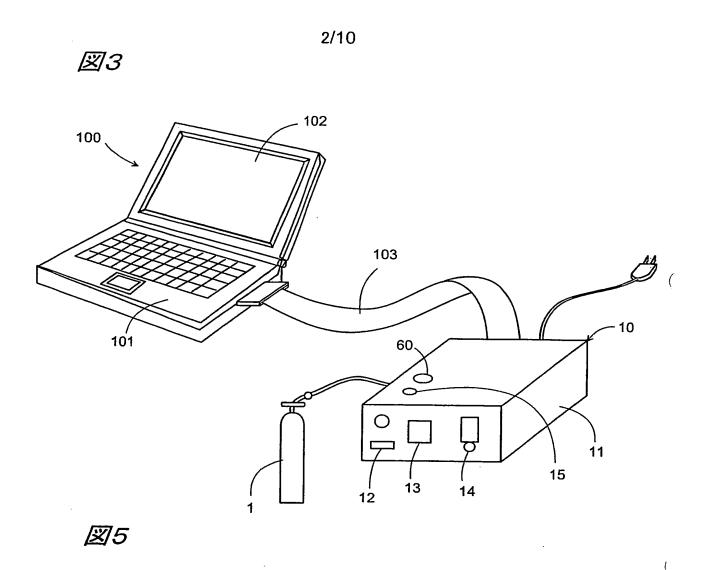
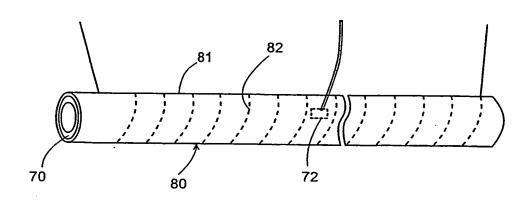
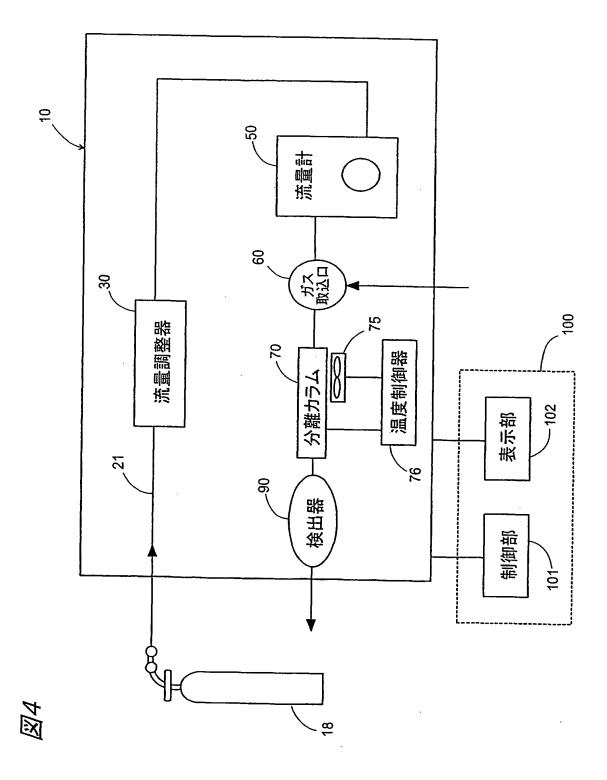


図2









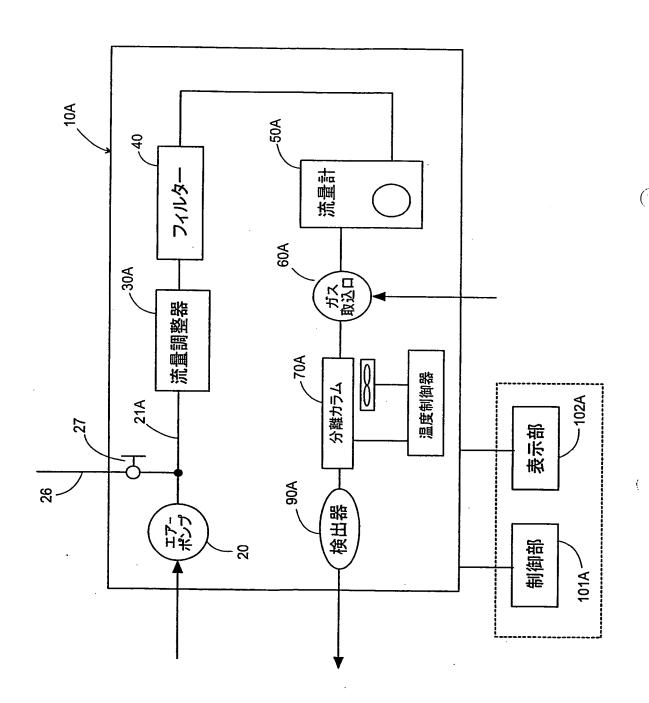
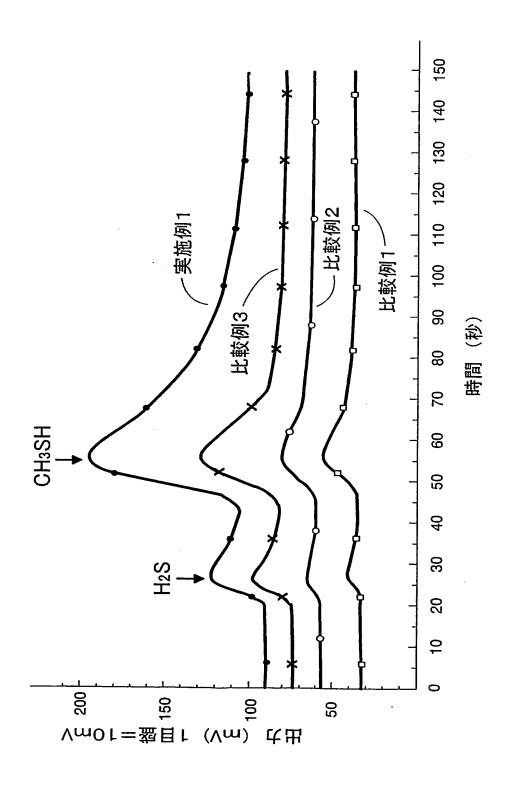
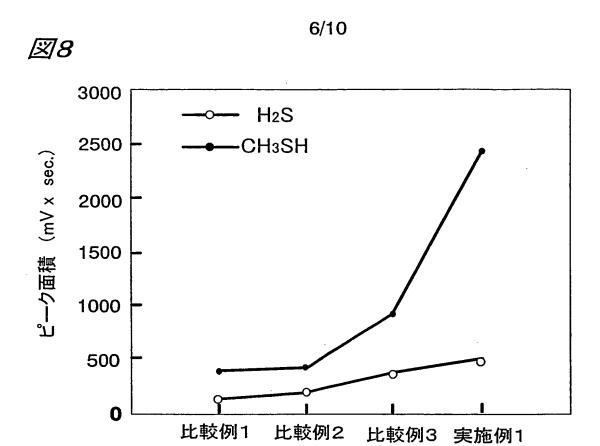
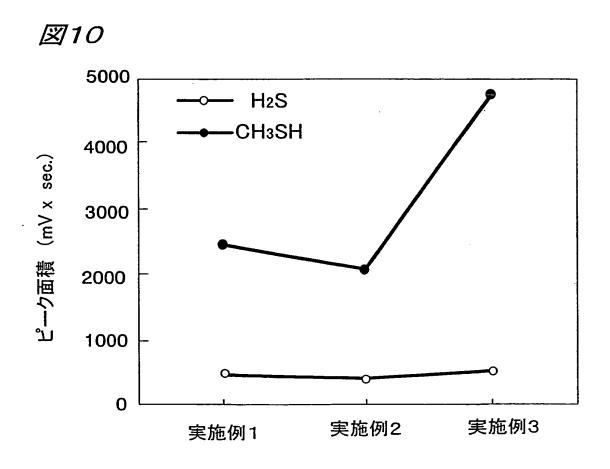


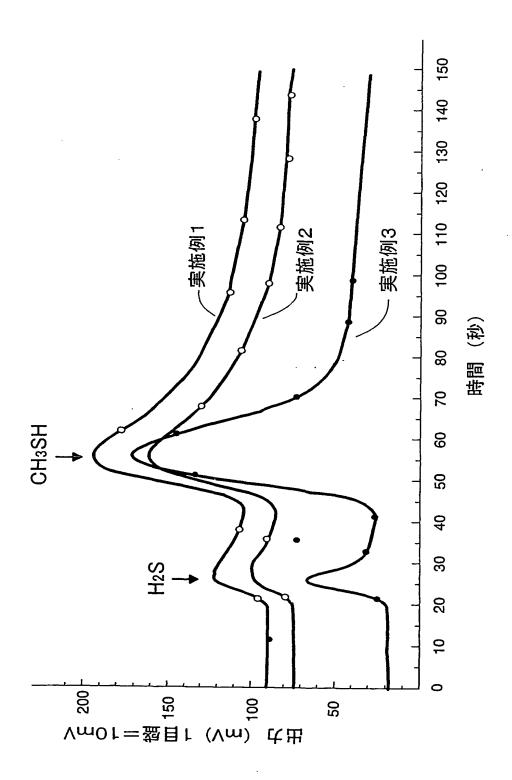
图6



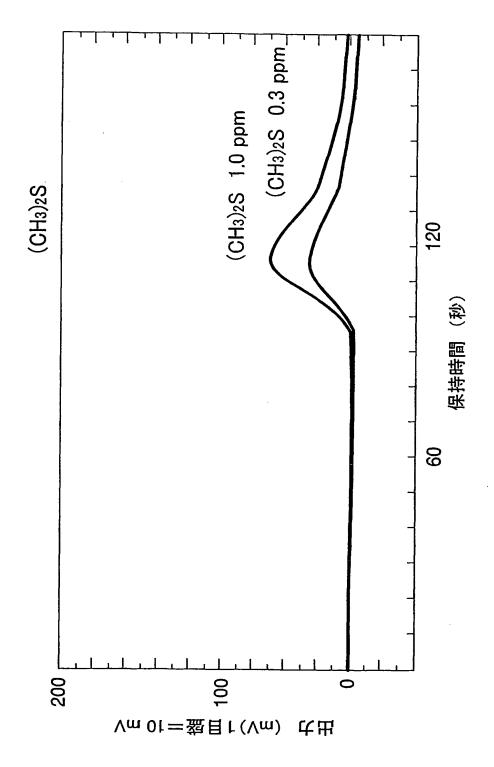
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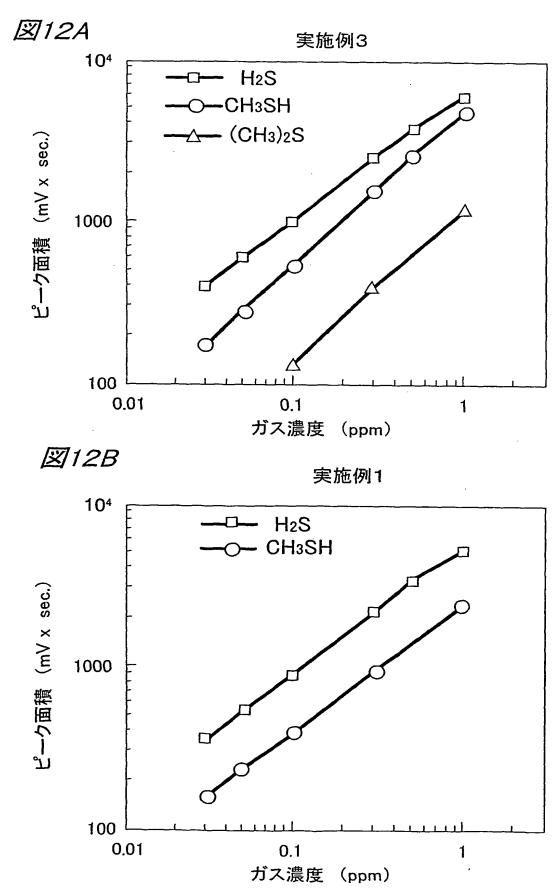






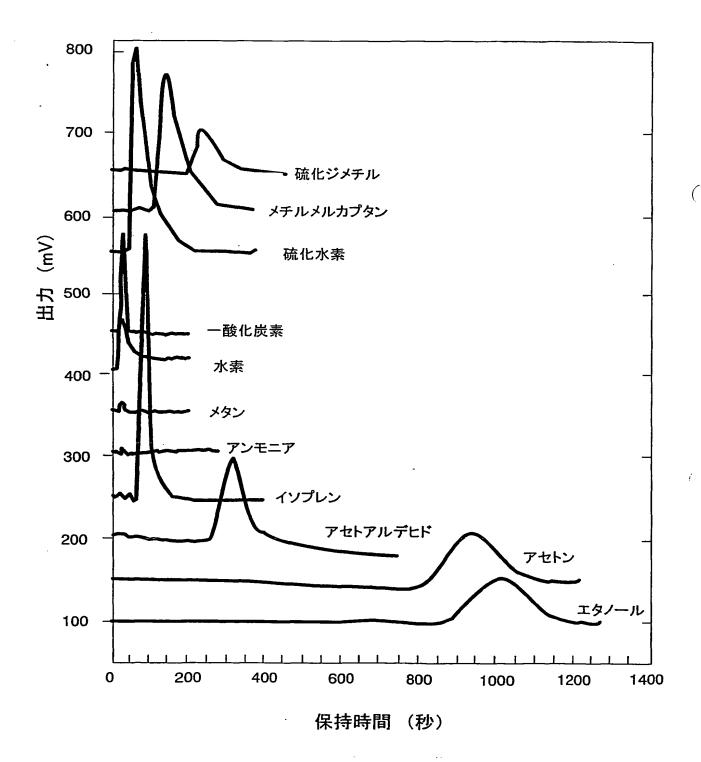
巡11

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10/10

図13



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP02/08696

According to International Patent Classification (IPC) or to both national classification and IPC According to International Patent Classification (IPC) or to both national classification and IPC B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) Int. cl' G01N27/12, G01N30/64 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Jitsuyo Shinan Koho 1922-1996 Toroku Jitsuyo Shinan Toroku Koho 1996-2002 Electronic data base consulted during the international search (same of data base and, where practicable, search terms used) C. DOCUMENTS CONSIDERED TO BE RELEVANT Category* Cliation of document, with indication, where appropriate, of the relevant passages Relevant to claim No. Y JP 6-213780 A (Kabushiki Kaisha Sensa Tekku), 1, 2 O5 August, 1994 (05.08.94), Par. No. [0007] (Family: none) Y JP 11-23509 A (Makoto EGASHIRA), 1, 2 29 January, 1999 (29.01.99), Par. No. [0013] (Family: none) Y JP 10-19820 A (Noboru YAMAZOE), 23 January, 1998 (23.01.98), Par. Nos. (0571, [0061] (Family: none) X Further documents are listed in the continuation of Box C. See patent family annex. Special categories of cited documents: "International filing date or office the continuation of the international filing date or office states of cashibit the publication date of number cites into or other reasons and states of the number of the same patent family annex. To document defining the general acts of the number of the manufacture of the principle of theory underlying the invention cannot be considered to be of particular relevance to repulsite the international filing date to international state of the number of the same patent family annex of the principle of the same patent family annex of the principle of the same patent family annex of the same patent family and the conditional patent family annex of the same patent family and the principle of the same patent family annex of the same pa	A CTACE	HEIGHTION OF CURRENT ATTER	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·				
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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP02/08696

C (Continuation). L~CUMENTS CONSIDERED TO BE RELEVANT						
ategory*	Citation of document, with indication, where appropriate, of the relevant passages					
Y	JP 8-122288 A (Kurabe Industrial Co., Ltd.), 17 May, 1996 (17.05.96), Par. No. [0010] (Family: none)	1,2				
A	JP 9-292383 A (Shimadzu Corp.), 11 November, 1997 (11.11.97), Full text (Family: none)	1,2				
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Form PCT/ISA/210 (continuation of second sheet) (July 1998)

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Y	JP 6-213780 A (株式会社センサー	テック) 1994.08.05	1, 2		
	[0007]				
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Y	JP 11-23509 A (江頭誠) 1999	. 01. 29	1, 2		
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様式PCT/ISA/210 (第2ページ) (1998年7月)

C (続き).	関連すると認められる文献		
引用文献の カテゴリー*	引用文献名 及び一部の箇所が関連するとき	関連する 請求の範囲の番号	
Y	JP 10-19820 A (山添昇) 1998. 01 【0057】, 【0061】 (ファミリーなし)		1, 2
Y	JP 8-122288 A (株式会社クラベ) 199 【0010】 (ファミリーなし)	6.05.17	1, 2
A	JP 9-292383 A (株式会社島津製作所) 1 全文 (ファミリーなし)	1, 2	

様式PCT/ISA/210 (第2ページの続き) (1998年7月)